AMERICAN

RAILROAD JOURNAL,

AND

MECHANICS' MAGAZINE.

No. 8, Vol. VII. New Series.] OCTOBER 15, 1841. [Whole No. 398. Vol. XIII.

REMARKS UPON A PAPER "ON THE BUILDING MATERIALS OF THE UNITED STATES OF NORTH AMERICA.—*By* DAVID STEVENSON *C. E., Edinburgh.*"—*Read before the Society of Arts for Scotland, in session*, 1841.

Mr. Stevenson has already become known to the profession in this country by his work upon Civil Engineering. The paper upon which we design to offer some remarks, has been but recently published, and probably from the length of time elapsed, the writer's memory has failed in recording many things which actually fell under his observation and for this, due allowance must be made. As this paper however, attempts to give general information as to our building materials, and as it has been very widely circulated, we have thought it incumbent upon us to notice a few of the egregious errors which the writer has made.

In characterizing Scotland as a stone country, and England as a brick country, Mr. S. adds, that the United States may be considered as a timber country, and supports his position by our *shingle roofs*, and *corduroy roads*, which latter are considered as compared with the McAdam roads of England and Scotland, the stone paved roads of France and the "clinker" pavements of Holland in which comparison our corduroy roads of course bring up the bottom of the list.

In speaking of iron, Mr. S. says that it is "pretty abundant," and forgetting our manufactories of machinery in all its forms, dismisses the subject with the following remark.

"It may be safely said, that the manufacture of iron in the United States, and what is more closely connected with the subject of this paper, its application to engineering works, are still in their infancy, at least when we regard the great extent and perfection to which these arts have been brought in Britain; and my observations on the materials of the country will therefore be confined to those of masonry and carpentry, as these are in some degree peculiar to the country, and any remarks regarding them will of course be more interesting."

Under the head of Brick, the following general remark is made:

"Experience in our own and in many other countries, has proved that brick is well suited for house-building; but experience has also shown that it is by no means so well adapted as stone for engineering operations generally; and to some works it is with us considered wholly inapplicable. Marble and granite, of which I shall afterwards have occasion more particularly to speak, occur in the northern parts of the United States; but stone easily accessible to the quarrier, and fitted for building purposes, is very rarely to be met with, and the American engineers have therefore been obliged, as is the case in all countries, to adapt the structure of the works to the materials they possess; and in making this adaptation, they appear to have violated many of the established rules of engineering as practised in this country. The scarcity of stone, and the unsuitableness of brick for hydraulic purposes, for example, has forced them to construct most of the locks and aqueducts on the lines of their great canals, wholly of timber, with which the country abounds; and that material, ill adapted as it may seem to such a purpose and situation, where it is not only exposed to the constant tear and wear occasioned by the lockage of vessels, but also to the destructive effects of alternate immersion in water and exposure to the atmosphere, has nevertheless been found in practice to form a very good substitute for the more durable materials used for such works in Europe."

Although wood has too often been used under the circumstances alluded to, it has been not so much from want of stone as a desire to complete works hastily and economically, yet there are many cases in which substantial stone works might have been noticed, in which "the established rules of engineering" have not been "violated;" for instance, the locks on the Delaware and Raritan canal. The use of wood instead of stone blocks for railroads seems here and elsewhere to be considered as one of these violations, practice has now given the preference to wood, and stone blocks have been removed

to make way for a material more perishable in the abstract, but more enduring as a component part of a railway structure.

In the notice of Granite which we insert, we are gravely told that the Sing Sing marble is a dark grey or bluish granite! of which the Astor House, "one of the few stone buildings in New York," is built.

"Granite is worked in the northern part of the country at Quincy in the State of Massachusetts, and at Sing Sing in the State of New York, and also in New Hampshire. The Quincy granite is of a fine grey color, and can be quarried in large blocks. It has been used a good deal in Boston and the neighboring country for architectural works. It has also been employed for railway blocks on some of the lines of railway in the neighborhood of Boston, and in the construction of the only two graving docks which exist in in United States, the one at Boston, and the other at Norfolk in Virginia, the latter at a distance of upwards of 500 miles from the quarries; and these, so far as I am aware, are the only engineering works of any consequence in America in which granite has been employed.

"The Sing Sing granite, which is of a dark grey or bluish color, is quarried on the banks of the Hudson, about 25 miles from the town of New York, at which place it has been pretty generally used for some time for stairs and lintels, and has lately been introduced for facing buildings. The Astor hotel, the largest in America, and perhaps in the world, which is one of the few stone buildings in New York, is built of this granite."

Have we not a "granite State" and mountains of granite, or can any one travel over but a small portion of our primitive formation without constantly noticing the immense masses with their surface already exposed and seeming to invite the hammer and the drill? But we cannot better correct these statements than by giving the following extract from Dr. Lee's Elements of Geology, etc.

"For building purposes, no country in the world possesses such an inexhaustible quantity and variety of granite rocks as New England; none more duarble in structure, or beautiful in appearance.

"Of the eastern States, Maine is pre-eminent for the abundance and excellent quality of her various granite rocks, which offer facilities for quarrying and exportation unequelled by those of any other part of the known world. Here all varieties are to be met with, porphyry and syenite, more beautiful than that of Pompey's Pillar or Cleopatra's Needle, to the close-grained, compact granite so often seen in the public buildings of New York and Boston. Situated directly upon navigable waters, it can be quarried and transported

to market cheaper than perhaps any building material in the country; many of the quarries of Maine, Dr. Jackson states, can furnish unhewn blocks of any size, on board ship, for $1 12 per ton, and the expense of transportation to New York is rarely more than $2 50 per ton. As the article in any of our principal cities is worth $7 per ton, this will give a profit of $3 38 for each ton of granite. Masses suitable for columns command about 90 cents per cubic foot; so that a column similar to those of the New York Exchange costs $1,500. At Kennebunk, rough-split granite sells for $5 per ton of 14 cubic feet on the wharf. The price remains uniform up to the dimensions of 25 cubic feet, and above that measure, two cents per foot is charged for every additional foot. Stones for store fronts, hammered, sell for 75 cents per superficial foot; and where two sides of a stone are fine dressed and two rough hammered, three sides are charged, and nothing is demanded for the ends. Where three sides are fine dressed and one rough hammered, they charge for four sides and not for the ends. Numerous and very extensive quarries of granite are now worked both in Maine and Massachusetts, which are a fruitful and increasing source of wealth to the inhabitants.

"In the State of New York we find mountains of granite and gneiss, and various modifications of these rocks, especially in Dutchess, Putnam and Westchester counties. Prof. Mather states, that 'there are many places in these counties where quarries may be opened, which would afford building materials of the best quality, and which, would endure the changes of our durable climate for ages, without decay or disintegration. The naked crags and masses of rock afford irresistible evidence on this point. These rocky hills and mountains, worthless as they now seem to most persons, undoubtedly contain the best of building materials. The quarries which will be opened, will form an important branch of industry, and will enable our citizens to construct both public edifices and private dwellings of our own native materials, and which are as durable and beautiful as those now brought from Maine, Massachusetts and Connecticut, at so great an expense.'"

Marble according to Mr. S. is our principal material and to it he devotes more space than to our granite. We must protest however, against his citing Messrs. Strickland and Struthers of Philadelphia, as authorities either upon this particular item, on the subject generally, these gentlemen no doubt feeling themselves rather awkwardly placed in being made sponsors for such monstrosities. It seems that the marble quarries in the vicinity of Philadelphia, were visited, and

as we have seen them ourselves, we can testify that they are primitive establishments, altogether behind the age—but by a rapid generalization, all "American marble quarries" are put into the same category. We cannot refrain from giving the passage.

"In some of the quarries which I visited, the beds of marble dipped from north to south at an inclination of 60° with the horizon, and they were worked at considerable disadvantage. In one quarry the men were working a bed of white marble, 14 feet in thickness, at a depth of 120 feet below the natural surface of the ground. The blocks, some of which weighed 12 tons, were raised to the surface by means of a rudely constructed horse-gin, there being no road to the bottom of the quarry, or rather pit, from which they are taken, by which even a man could conveniently, or safely, descend or ascend, without the use of a rope to prevent his falling headlong to the bottom. In this respect the American marble quarries reminded me of the celebrated sandstone pits of the ancient city of Caen in Normandy, which are not only remarkable as having produced the materials for the old London bridge, but as presenting a mode of working very similar to that pursued in the coal pits of this country; the blocks, being excavated at a great depth under the ground, are conveyed in subterranean passages to shafts, through which they are raised to the surface by horse power, as in the American quarries."

The passage immediately following, is the "gem" of the whole paper. Possessed with the idea that this is our sole building material, Mr. S. makes this wise conclusion.

"The price of American marble, varies according to its quality and kind. The carriage of the materials, owing to the badness of the roads, forms a very expensive item in all the public works, and is of course, regulated by the distance of transport; but the white marble costs about 4*s.* 10*d.*, and the blue about 4*s.* per cubic foot at the quarries, and although this may seem a very moderate price for marble, which in this country costs from 16*s.* to 2*l*, a cubic foot, still, when used instead of stone throughout the whole thickness of the wall of a dwelling house, or the pier of a bridge, it becomes, even at the lower price I have mentioned, a costly material."

The Stockbridge quarries were not examined, and are merely stated to furnish white and blue marbles, while those in Vermont afford black and white. As our author gives us no further information, we take the liberty of supplying this omission by another extract from Dr. Lee's Elements, etc.

"The Stockbridge marble is well known, as the City Hall of New York is built of it. It is a pure white, moderately fine grained, and very durable. The Lanesborough and Sheffield marble is very similar, and from the Sheffield quarries the marble is obtained which is now employed in the erection of the Girard College at Philadelphia. 'A visit to this quarry,' says Professor Hitchcock, 'will give one perhaps, the best idea of the value and extent of the Berkshire marbles, and, at the same time, of the power which the arts give to man over nature. To see masses more than fifty feet long, and six or eight feet thick, split out by the apparently feeble means employed. makes a strong impression on the mind, and recalls the history of the enormous blocks of stone quarried and removed by the pyramid builders of antiquity.' It may with safety be said, that no marbles in the United States exceed in elegance and durability those of Berkshire county. The value of all the marble now exported from that county cannot be less than $70,000 annually, and the beds are inexhaustible."

Making no mention of the extensive marble quarries of New York, the beautiful varieties found in Connecticut, nor of the celebrated Potomac breccia marble, after naming but four localities, we are told in conclusion, that :—

"Those enumerated are the principal quarries in the United States ; but from the circumstances of their being so much confined to particular localities, and the manner in which they are worked, it is evident that their produce cannot be applied by any means to the general wants of the country ; and consequently, excepting in the case of buildings on which a good deal of money is to be expended, it is but little employed, the cost of the material itself, and the expense of carriage, being very considerable."

We give entire what follows, because with the exception of one strange mistake, it is a redeeming paragraph. The criticism upon the want of taste displayed in the colors of the exteriors of our houses, is, with a few honorable exceptions, richly deserved, and indicates Mr. Stevenson's good taste.

"The marbles of the United States, according to the account of many intelligent Americans with whom I conversed on the subject, are not suited for sculpture or very fine ornamental works, or even, indeed, for the capitals of columns, which require superior workmanship and the marble used for the capitals of all the fine buildings throughout the country, it is imported from Carara in Italy, whence a very large quantity is annually exported to America. For similar purposes black marble is also imported into the States of

Ireland. If, however, I might form a judgment from the quality of some of the specimens which I procured, I should think that were the American quarries efficiently worked, there could be very little necessity for applying either to Italy or Ireland, for so great an annual supply. Those buildings which are constructed of the whitest description of American marble, carefully selected for the purpose, such as the Capitol and the President's house at Washington, the Bank of the United States, the Mint, and other public buildings at Philadelphia, and the monument erected to the memory of Washington at Baltimore, have certainly a most imposing and gorgeous appearance, owing to the fineness and beauty of the material. But the buildings which are constructed of the blue or unselected marble, such for example, as the State Capitol at Albany, or the Town-House at New York, have a bloated and dingy look, and the general effect produced by the marbles in these buildings is greatly inferior to that of some of the sandstones from Craigleith and other British quarries.

"The white marble retains its purity of color much longer in the United States than it would do in this country owing to the clearness of the atmosphere and the absence of smoke, the use of anthracite coal, which produces no smoke during combustion, being common in most of the towns. These circumstances may also account for the seemingly permanent vividness of the various colors, such as red, white, brown, yellow, and green, with which according to the taste of the occupiers the exteriors of the brick houses in New York, and many other towns in the United States, are generally planted."

Thus concludes the notice of our mineral materials. How the writer could have put together so much that was incorrect, is a mystery to us, unless, indeed, the lapse of time between his visit to this country and the date of the paper, as before hinted, may have rendered his memory treacherous as to facts. The consideration of the remainder of his paper we reserve for another occasion, but before we conclude, it will not be amiss to refer to several singular omissions. Mr. Stevenson does not seem to be aware of the fact that in our country are to be found the representatives of nearly every rock found in Scotland or England,—that our surface is much greater, and that consequently the same formation covers a vast extent of country, and diffuses the same mineral over a large space, and that these mineral treasures are wrought only in proportion to the wants of the community, and that the same scale which meas-

ures propinquity in the dense population of Great Britain, will not do in our country, either for men, mines or quarries.

Had the writer but recollected for a moment, he must have remembered the striking ridge on the west bank of the Hudson, called the Pallisadoes, which, for about thirty miles, presents one of the most remarkable features of our noble river. At the foot of these hills, he might have observed immense masses of debris, into which, here and there openings seemed to have been made ;—these, a few years since, were the sources of the stone for the Delaware breakwater, (Mr. Stevenson says our breakwaters are built of wood,) and yet an impression has hardly been made, and only the careful observer could detect either the marks of human labor or the immensity of the masses before him.

In the same region, and indeed in many other places, might be seen vast quantities of sand stone, which, by the way has not even been mentioned in this communication, and this is a most important material and much used.

Our vast bowlder formations is also entirely overlooked in the search for quarries; and no one can, for a moment, hesitate to say that they are, for ordinary purposes, our most valuable source of stone. Who would take the trouble to dig into the bowels of the earth for that which lays already to his hand upon the surface? or who would hesitate between a corduroy road and a Mac Adam turnpike, particularly when the latter was cheaper?

We have passed over miles of railroad, which, for the breadth of a double track and for two feet deep, formed an entire stone wall, and most if not all of this stone taken from the surface of the ground. A glance at any of the geological reports will show what an unlimited variety of materials is providentially furnished us at the least possible cost, and the use of which actually enhances the value of the ground.

Upon the whole then, we feel satisfied with the supply of building material in our country, and are neither disposed to envy our transatlantic brethren either of Scotland, England or France for being, as our author seems to think, richer in stone than we are.

PHILADELPHIA AND POTTSVILLE RAILROAD.

We may now announce with every certainty, that the Philadelphia and Pottsville railway will be completed to the mines before the closing of the year 1841, or in the course of the next two months. No greater blessing could possibly be conferred on that region, which may henceforth consider its supremacy in the coal trade

fully secured; and they may well be proud of this railroad as embracing more of the qualities which constitute perfection in such a work, than can any where else be presented.

Towards its prosecution and final completion, it is well known that this region has not contributed a cent, which may well have been owing to circumstances above their control, but it is not likely they will allow the occasion of the opening of this road to go unsignalized by some appropriate mark in acknowledgment of its great advantages to them.

What, under the circumstances, therefore, could be more suitable than for this region to present the road with a pair of locomotives, either for travel or burden, to be called the "Pottsville" and the "Schuylkill Haven," which should run forever over the road as a memento to show that their hearts are as full of gratitude as the hills of the region are of coal.

A contribution of about 3000 tons of coal, disposed of in Philadelphia, at $5 per ton, would accomplish such a purpose, and could be so arranged as to be little onerous to the region, the principal value of such a gift being understood to consist in its being an ever living and active evidence of a mutual good feeling between the parties. A committee of the leading miners of this region would do themselves infinite credit in organizing and giving execution to the above suggestion in time for a "celebration" on the 1st of January, 1842.

NEW YORK AND ERIE RAILROAD.

NEW YORK, *November* 1st, 1841.

MY DEAR SIR: At your request I have hastily thrown together some remarks on the prospects of the NEW YORK AND ERIE RAILROAD.

The ideas contained in them are familiar to yourself and the other gentlemen who have watched over the interest of the company. They can therefore lay no claim to originality, but may still be interesting to those who, though willing to listen to truth, have not examined the arguments on which our confidence is founded.

Very respectfully your obed't serv't,

EDWARD MILLER.

Chief Engineer N. Y. and Erie Railroad.

To the Hon. AARON CLARK.

Communication from the Chief Engineer of the New York and Erie railroad, on the revenue and prospects of the road.

In the report of the committee of ways and means to the house of assembly of New York in 1838, the future greatness of the mighty northwest was shadowed forth by a master hand.

The predictions and calculations of that able paper were sneered at by the sceptical and derided by the prejudiced. Mr. Ruggles was termed a schemer, an extravagant visionary; and yet many of his conclusions, which then seemed wildest, are already matters of history, and those still in the womb of time are steadily working out their own fulfilment.

None but those who have seen the favored region bordering upon the lakes, and attentively considered its geographical position, its immense natural resources, and the countless throng of hardy, intelligent, and enterprising yeomanry, which is rushing westward like a mighty torent, can form just conceptions of the capabilities of this inland empire. Until lately the tide of immigration was so strong, that all the produce of Indiana, Illinois and Michigan, was insufficient to feed the comers, and large quantities of provisions were sent from Ohio, Pennsylvania, and New York, in order to supply the deficiency. This unnatural course of trade, however, is now arrested, and the increasing tolls on the Erie canal during the two last years, in spite of new avenues which have been opened, and the general depression of trade every where, indicate the commencement of that commerce which, if secured exclusively to New York, must make her the greatest city in the world, and which, even if shared with Boston, Philadelphia, and Baltimore, will more than satisfy the most avaricious cravings of all.

The avenues which are now opened for this trade are crowded, and before those in progress or contemplated can possibly be completed, the business for them will be created and ready.

In the last general report of the directors of the New York and Erie railroad, the subject of the lake trade was hardly touched. The board preferred considering the road in that light in which many of its friends feared to regard it, viz: as a work depending upon the local trade of its borders.

The following statistical information is condensed from that report:—

The railroad traverses eleven counties, containing a population of 340,385; and as many more counties and parts of counties, containing 266,085 inhabitants, will be tributary to it in New York alone.

In Pennsylvania and New Jersey, an entire range of counties, estimated to contain 230,000 people, will also use the road.

The present population, therefore, waiting anxiously for the road, exceeds 836,000, and under the influence of its construction and use will exceed a million in 1845. The counties in this State through which the road passes increased in population in ten years, from 1830 to 1840, thirty per cent., while the taxed valuation of real and personal estate has nearly doubled. This increase was doubtless caused in a great measure by the confident hope of the construction of the railroad.

The whole number of persons tributary now to the Erie canal and the railroads near it, may be set down in round numbers at a million, of whom nearly or quite 300,000 would prefer the New York and Erie road, if it were finished. This million pays an average of nine dollars each for tolls, freight, and travel, annually.

If the people residing on or near the southern road pay only half as much in proportion to their number, (and there seems to be no good reason for such a reduction, since the southern counties are generally more fertile and productive than those on the canal, and are besides rich in the treasures of the mine and the forest, which are wholly wanting on the rival route,) even with this large reduction, and estimating the road to cost $12,000,000, and those using it to be but 800,000 in number, the profits, after paying all expenses, would be $2,500,000 per annum, or more than 20 per cent.

These statements are necessarily meagre. The report alluded to, to which attention is invited, elaborates the arguments above stated, and adduces many others which show conclusively that it is not necessary to assume that a single passenger or a ton of freight shall be drawn from a point west of Dunkirk, in order to prove that the stock of the New York and Erie railroad will be a most safe and profitable investment.

But the friends of this improvement claim that it is the best, shortest, and quickest route between the city of New York and the lakes, and that it must therefore be the great thoroughfare between the commercial metropolis of America and "the brotherhood of nations" which is springing into power around our inland seas.

Commencing at a point on the Hudson from which steamboats can run regularly to New York in winter as well as summer, and terminating at a harbor on lake Erie 40 miles west of Buffalo, and always open earlier in the spring and later in the fall than the latter place, the distance from New York to Dunkirk is 468 miles.

By the line of railroads running near the Erie canal, the dis-

tance from New York to Buffalo is 470 miles, and as Dunkirk must be taken as a point of comparison for the western travel, the New York and Erie road has the advantage in distance of 42 miles.

With such a road as the company are now making, the time occupied in passing over the entire route will not exceed 24 hours for the through-passenger trains, and the charge for first class passengers will not exceed twelve dollars, while the second class will be carried for half that sum.

If the New York and Albany road were completed, and substantial superstructures, with heavy iron rails, were laid throughout the whole northern route, instead of the slight and dangerous ones now employed, and if arrangements were entered into between the different companies forming the chain so as to avoid detention and changes of cars, Buffalo might be placed as near to New York as Dunkirk will be, both in point of time and distance; but still 40 miles of steamboat travelling on lake Erie would be added to the journey of those who should prefer this route to the New York and Erie railroad. As matters however are likely to stand for the next ten years, the saving in time by taking the southern route will be about 17 hours.

The northern route already shows the difficulties under which a long line labors, when made up of a number of independent corporations. Each link(although one of them extends only 16 miles) has a seperate organization in every branch; its own general superintendents, cars, engines, and workshops. There will be in the chain eight or perhaps ten companies: the works of some favorable in point of expense and character,—others very costly and difficult to manage.

To fix a tariff of prices, when a powerful rival comes into the field, which will be just to all, and yet low enough in the aggregate; to prevent local detentions, when the stockholders of each portion are chiefly inhabitants of the towns and villages, and interested in producing delays; to avoid clashing and ill feeling, such as is now witnessed between two of these corporations; to find, in short, *an animal with eight or more heads which is not a monster;* are matters involving most grave and serious difficulties.

The reduction in price which the company proposes, when joined to the rapidity and comfort of transportation, must have the effect of throwing upon the New York and Erie railroad nearly all the emigrant passengers, and at least a moiety of those paying as first class.

If we suppose that there are only enough of these, however, to make a single through-train daily, in each direction, say 250 first class and 200 second class passengers, one thousand dollars per diem will pay all the expenses of carrying them, and the receipts, even at the low rates of twelve and six dollars, will amount to $8,400 per diem, leaving a clear profit of $2,701,000 per annum; enough to pay 22 per cent. on a capital of $12,000,000 from through-passengers alone. In making these calculations, the difficulty consists, not in swelling the amounts, but in keeping them down to the level of moderation. We fully believe that all our anticipations will be more than realized by the results of experience.

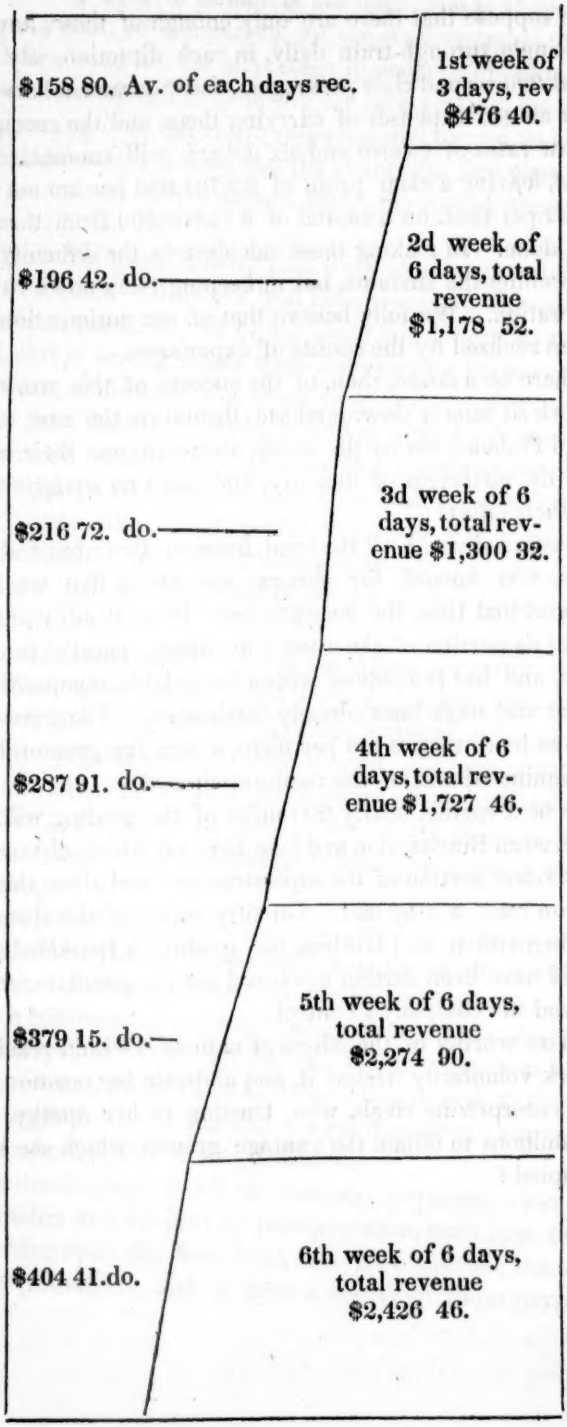
Can there be a doubt, then, of the success of this work? Will New York sit tamely down and see Boston on the east, and Baltimore and Philadelphia on the south, stretching out their iron arms to grasp the birthright of this city, and make no struggle to rescue it from their efforts?

The eastern division of the road, between Piermont and Goshen, 46 miles, was opened for general use about five weeks since. Throughout that time, the receipts have been steadily increasing, although this portion of the road runs nearly parallel to the Hudson river, and has to contend with a formidable competition from steamboat and stage lines already established. The revenue now amounts to more than $400 per diem, a sum far greater than the most sanguine friends of the road anticipated.

Before next spring, nearly 200 miles of the grading will be completed between Binghamton and lake Erie, on which distance much of the wooden portion of the superstructure, and about thirty miles of the iron rails, will be laid. On fifty miles of the distance between Binghamton and Goshen, the grading is two-thirds finished and would have been further advanced but for peculiar circumstances, beyond the company's control.

The prize worthy of the efforts of nations is within reach. Will New York voluntarily decline it, and abdicate her position in favor of more enterprizing rivals, who, trusting to her apathy, are expending millions to obtain the vantage ground which she has hitherto occupied?

A PROFILE exhibiting the gradual increase of Revenue upon the Eastern Division of the New York and Erie Railroad, between New York and Goshen, from the opening of the road, on the 23d of September, to 30th of October, 1841,—33 working days.


$158 80. Av. of each days rec.
1st week of 3 days, rev $476 40.
Sept. 23.
$196 42. do.
2d week of 6 days, total revenue $1,178 52.
$216 72. do.
3d week of 6 days, total revenue $1,300 32.
$287 91. do.
4th week of 6 days, total revenue $1,727 46.
$379 15. do.
5th week of 6 days, total revenue $2,274 90.
$404 41.do.
6th week of 6 days, total revenue $2,426 46.
Oct. 30.

HORIZONTAL SCALE 4½ days to 1 inch—VERTICAL, $200 to an inch.

NOTE.—*The receipts upon the 28th, 29th, and 30th of October average $409 06, per diem.*

UTICA AND SCHENECTADA RAILROAD.

"Will some of our New York and Albany friends inform us whether the Utica and Schenectada railroad company are prohibited from carrying merchandize over their road, during the whole year; or, if they are allowed to do so while the canal is closed?"—*Philadelphia Gazette.*

It is not sufficient to answer, that they are prohibited from carrying merchandize at all seasons. We would call on our Albany friends, and particularly certain directors in this company to enlighten us, as to the mysterious policy they have pursued in circulating the idea, much to the injury of the railway system in this State, in remarks like the following, "that *their* railway was not competent to carry freight; that it was not profitable for railways to carry freight and passengers over the same road; *that they did not wish the privilege to carry freight.*" While this language was held by certain directors in Utica and Albany, there was an unseen influence exerted along the line of the railroad, to get up petitions to the legislature "to *compel* the Utica and Schenectada railroad company to carry extra baggage," as an accommodation to the public, on paying Erie canal tolls into the State treasury.

The canal interest, took alarm at this covert mode to carry merchandize, and to facilitate emigration and travel through this State. It was understood that the canal interest, which the railway directors appears to have been afraid of, defeated this bill, and added insult to the friends of railways and common sense. They amended the bill, so as to read in one section, as follows. "It may be lawful for the Utica and Schenectada railroad company, to transport *without charge*, extra baggage, or articles for passengers or who may have charge thereof, travelling in the same train of cars, on which the same are transported."

The canal influence was exerted in 1839, when numerous petitions were again presented to the legislature, "praying that the Utica and Schenectada railroad company, should be *compelled* to carry freight, as well as baggage." These petitions conceded that the State should levy black mail on private enterprise, in the shape of canal tolls, to be exacted by the State on all goods passing on this road, yet strange to record, this beneficial law was defeated.

We well recollect the speech of Mr. Noah Cook, a leading member from this city in 1839, a professed friend of internal improvements, who, like many others of that day, believed that improvements only meant, the Erie canal and its enlargement. This gentleman scouted the idea, that railways, parallel to the Erie canal

should be permitted to carry freight, or extra baggage, during the period of its navigation, even with the payment of canal tolls. He told the committee of the whole, of the assembly, himself a forwarder of large and respectable standing, "that it would ruin the business of the forwarders, if the railway was to carry freight and extra baggage, that the forwarders made comparatively nothing in transporting a barrel of flour from Buffalo or Rochester, to New York, that their main profit was derived from the *up* transportation of merchandize, and particularly from passengers in their semi packet boats, that if railways were permitted to take the extra baggage of emigrants, *on any terms*, it would ruin their business and prevent the enlargement." Such arguments prevailed, although as a great boon, it was proposed and carried, in committee, that the road should have the extraordinary "privilege, of carfying freight during the time the Erie canal was closed, provided they paid into the State treasury canal tolls on all freight transported." It need not be stated to any one acquainted with railways, that it was no object to the company to accept this favor. It was about as important to them, as to carry extra baggage at an extra cost to the company, free of charge. For so short a period as the winter months, it would never pay the cost to procure the extra *motive power* and cars requisite to operate this road at a period when it would be the least effective, certainly more costly in fuel, to draw less loads, than in the summer months.

Had the friends of this road, and another important road met the repeated requests made them during the sessions of 1839, '40, and '41, to examine into "*the relative merits, with cost of transportation on canals and railways*," we should not have taken the pen to expose the ridiculous assertion, that "*the Utica and Schenectada railroad, was too weak and fragile to sustain the weight of freight trains.*" In their hearts they knew the error of this statement, or the directors are more weak in intellect, than we are willing to suppose them to be. Certainly, they had seen trains of 100 tons of wood, carried over the road with a bearing of 3 tons on the 4 wheels, of each freight car, drawn by a locomotive engine, having the pressure of 9 tons on *two* points; *the driving, or adhering wheels*, yet strange to state, a certain director in Albany gravely argued with the uninitiated, that a load of wood, or merchandize, of three tons, divided over four points of bearing, was more injurious to the road than the locomotive, therefore, it would not answer to carry freight, and that the company did not wish to carry it, unless they were "*compelled to.*"

The days of humbug, under this order of things in this State, we

trust has gone by, we hope the period has arrived, when every class of public improvement, and the mode of operating them, whether by the State, or private enterprise, aided by the State, will stand on their separate merits, and that a legislative committee, consisting of three members from the Senate and five from the Assembly, will, at an early period of the ensuing session, investigate the merits of railways, compared with canals, preparatory to a fresh departure in support of a system, or some general law to aid in the construction of railways, "between desirable points, judiciously located."

MANHATTAN.

EXTRACT FROM "A SKETCH OF A RAILWAY JUDICIOUSLY CONSTRUCTED BETWEEN DESIRABLE POINTS."

As further illustrative of the advantages of long lines of railway, and as affording some other useful views on the subject in general, we offer a summary of the report of the New York, and Erie railroad, now in progress, and which it is calculated can be maintained from the *way travel and business alone*, leaving that obtained at either termination for the *whole line* as profit, and ample after paying interest on State loan to give the stockholders a liberal dividend.

The distance from Dunkirk, on lake Erie, to *Piermont*, on the Hudson, is - - - - - - - - - 446 miles. The distance from Piermont to New York is - - 22—468 miles being the whole distance. The track is six feet wide, with an edge rail of 56 lbs. per yard, and for nearly two hundred miles is built on piles. It is intended to finish it in 1845, at a cost of $9,000,000, of which the State, by the present arrangement, is to furnish $6,000,000, and the stockholders $3,000,000. If it can be completed for $10,000,000, it would still be a cheap road, and that sum need not be exceeded, if the contributions along its line, in right of way, labor, etc., are carried out.

Taking as some guide the business on the Erie canal, through the northern tier of counties, with a population per last census of seven hundred thousand, they seem with good reason to rely upon the way travel being ample on this railroad to support it, the southern tier of counties, through which it passes, being calculated to have a population of about one million when the road shall be finished, in 1845. To the north on the Erie canal, in 1839, the whole traffic was as follows, and which must increase annually:

162,500	tons mdz., of an average value of		$280	per ton
500,500	" manufactures, flour, etc.,	do.	125	"
764,000	" lumber, coal etc.,	do.	51	"
1,426,000	tons, total estimated value,	-	-	$73,400,000

On the above 1,426,000 tons there were paid
in tolls to the canals, - - - $1,500,000
On the above 1,426,000 tons there were paid
in freight to forwarding men, - - 4,500,000
The travelling consequent on this business per
annum, is estimated to cost - - 3,000,000—9,000,000

The railways on the line of the Erie canal derive nearly one half of their whole receipts from the *way travel*, although the canal takes a good portion of it, and in respect to freight, they are not allowed to carry it, although offering to pay the canal tolls. The travel is here found, for short distances, to be as two to one compared with that for long distances.

Now, on the line of the Erie railroad, with an estimated population 30 per cent. greater than along the Erie canal, there would be neither competition nor restriction like the above, nor is there any reason for supposing a difference in the wants and business energies of the two populations, only that the former would be more stimulated by an improvement affording greater facilities, and which would be the certain means of drawing along its line, in preference to going to the far west, a fair share of the large daily influx of emigrants from Europe, who would there find cheapness and fertility, without letting go their hold on civilized life.

Of the tonnage on the canal about one half is of a value to seek a railway in preference, by which it would only be two to three days from the emporium of the States, instead of eight to nine days as now by canal and river.

It is intended to work this railway by sections of eighty miles each, adapting the weight of the locomotives to its varying grades, which are as high as sixty feet per mile for short distances.

The present mixed route to the lake, by river to Albany and thence by railroads, is as follows:

From New York to Albany, by the Hudson river, - 147
From Albany to Buffalo, by railroads, - - - 320

467 miles,

or the same distance as by the entire railroad route terminating at Dunkirk. With a railway to Albany, to obviate the closing of the river in winter, New York would then be doubly armed against any undue diversion of trade from her by the connection of Boston with the same points.

Having thus adverted to the different routes to the lakes, it is next of consequence to understand what are the expenses of transportation by those at present available, and to compare them with the rates which would remunerate a railway, say either the New York Albany and Buffalo, or the New York and Erie, the latter having rather a more open port at Dunkirk than the canal or railway at Buffalo. The cost of transportation on these railways, for four hundred and sixty-eight miles, would be rather under $4 per ton, calculated at 80 cents per mile, and on a nett load of 100 tons, so that

these companies could well *stipulate to carry at the rates affixed below,* on condition of their roads being carried through forthwith, by which some millions of dollars could be saved annually to the public on the best portion of the one and a half million of tons now carried over the canal and river, besides the gain in time of at least a week per trip, and operating all the year round.

STATEMENT.

ARTICLES.	Lake Erie to New York.		New York to Lake Erie.	
	From Buffalo, 150 ms. by river, 363 " by canal, 513	From Dunkirk, by railway, 468 miles.	To Buffalo by river and canal 513 miles.	To Dunkirk by railway 468 miles.
	Freight and toll per ton of 2,200 lbs.	Freight and toll per ton of 2,200 lbs.	Freight and toll per ton of 2,200 lbs.	Freight and toll per ton of 2,200 lbs.
Flour,	87½ cts. pr bbl., or $9 62	67 cents per bushel or $7 87		
Grain,	25 cts. per bush., or $10	20 cents per bush. or $8		
Provisions, Ashes, Seed,	45 cts. pr 100 lbs., or $9 90	37 cts. pr 100 lbs. or $8 14		
Furs & skins,	$1 per 100 lbs., or $22	75 cents per 100 lbs. or $16 50	$1 30 per 100 lbs. or $28 60	60 cts. pr 100 lbs. or $13 20
Light goods,	- - - - - -	- - -	95 cts. per 100 lbs. or $20 90	55 cts. pr 100 lbs. or $12
Heavy goods,	- - - - - -	- - -		

The above rates on light and heavy goods are those of 1840. In the present season of 1841, in consequence of the competition through the Oswego canal, Lake Ontario and Welland canal to Lake Erie, they have been forced to carry at 70 cents for light, and 60 cents for heavy goods per 100 lbs. on the Erie canal; but these rates are *admitted to be ruinous,* which therefore settles the question of the railway being the cheapest, as at those rates it would be well paid. Thus the canals should be bound to carry at, or in view of the loss of time by them and other losses sustained by the public in foregoing the railway, *under* the rates at which the latter would stipulate to do the business, as the only real test of their being cheaper carriers—otherwise to the favoritism now shown to them in the State of New York, will be added the vilest monopoly.

By the present mixed Pennsylvania route from Pittsburg to Philadelphia, 348 miles, the charges for 1841 are stated to be:

Flour, $1 25 per bbl., $13 75 per ton of 2,200 lbs, - - - -	By the *Middle route* of railway $9 00 pr ton would pay.			
Cotton, 56¼ cts. per 100 lbs. $12 37 per ton of 2,200 lbs. - -	do.	do.	$10 00	do.
Provisions, 62½ cents per 100 lbs. $13 75 per ton of 2,200 lbs. -	do.	do.	$8 00	do.
Tobacco, 62½ cents per 100 lbs., $13 75 per ton of 2,200 lbs. -	do.	do.	$8 00	do.

From Philadelphia to Pittsburg the rates for 1841, are about 18 to $25 per ton on heavy goods; on fine goods, 28 to $30 per ton.

The charge for light freight at $28½ per ton, in 1840, per Erie canal, is called and passes for cheap, but at $14 per ton by a railway, it would pay better and be *cheaper*, and thus only by presenting a later and improved standard, can the public escape being mystified, and be enabled to see, that canal transportation is only cheap, as compared with that by the horse-wagon or the ox-team.

It should not be overlooked that the Erie railroad passes through Olean, at the head of the Alleghany river, which will in time connect it with Pittsburg and the Ohio valley, the intention being to improve that river for a steamboat navigation.

What then is the *mere cost* of freight by river and canal, and by railway only, to the lake, without toll or profit in either case?

By river.—150 miles, freight and towage per ton by *canal boat* of 50 tons, (only about 25cts. pr. ton by the large *tow barges* of 3,500 bbls.) - - - - - - - -		62 cents.
By canal.—363 miles, at one cent per ton per mile, average time of trip to and from Albany and Buffalo 16 days, and longer while the enlargement goes on -		$3 63—4 25
Railway.—468 miles by railway, in 50 hours to Dunkirk, would cost, at 80 cents per mile and load of 100 tons nett, - - -		$3 72

But put them at the same cost of freight, (although the canal boat must be further liable to a toll at least adequate to maintain the canal,) and the railway would have the advantage of a week in time of delivery, and an earlier navigation at Dunkirk, which on many articles would be equal to the whole charge by canal.

The toll is a charge distinct from the freight, and appertaining exclusively to the canal and railway, necessary first to cover repairs and maintenance; and secondly, interest on cost and a fair profit, to accomplish which, the charge should vary with, and be regulated by, the amount of tonnage passing over the improvement, as illustrated by the two following *extreme*, but real cases among canals;

Erie and Champlain Canal—		
Cost $8,500,000 440 miles, interest 7 per cent., - - -	$595,000	
Repairs and maintenance, for 1840,	364,000—	959,000
Passes 1,400,000 tons, on which, to repay the above, an average toll is required for the whole distance of per ton. - - -		cts. 68½
Tide Water Canal on the Susquehanna—		
Cost $2,800,000, 42 miles, interest,	$168,000	
Repairs and maintenance, -	42,000—	210,000
Passed 70,000 tons in 1840, on which to repay the above, an average toll is required the whole distance of per ton, - - - -		$3

Any charge exceeding these rates which are mere *toll* independently of *freight*, would be profit over and above the interest on the capital and current expenses. The Tide Water canal received $35,000 in 1840, and therefore the average toll for the whole distance was 50 cts. per ton. On minerals it is restricted to one half cent per ton per mile, or twenty-one cents for forty-two miles, and is not allowed to regulate the charge on the standard of repaying interest on repairs, costs, etc., even if competition permitted, and thus, as adverted to in note No. 7, have canals been *made to pass for cheap*, greatly to the disadvantage and just progress of railways, by being obliged to consider in most cases, their first cost as sunk.

IT COMES TO THIS, THEN, THAT THE RAILWAY IN MOST CASES, CAN CARRY MERCHANDIZE AT OR UNDER THE COST OF FREIGHT ON A CANAL, AND IS (WITH PERHAPS THE EXCEPTION OF THE HUDSON RIVER) AS CHEAP ON ALL OPEN RIVER AND BAY NAVIGATION USING STEAM, AND THAT THEREFORE, ANY CHARGE FOR TOLL BY CANAL, WOULD BE ONLY AN ADDITIONAL BOUNTY IN FAVOR OF THE TRADE SEEKING THE RAILWAY, WHICH BESIDES, NEVER SUSPENDS ITS OPERATIONS, AND HAS A GREATER DESPATCH AND CERTAINTY OF ARRIVAL, THAN EITHER OF THE OTHERS.

The objection to the apparent disparity in the amount of capital required for the railway more than for the steamboat, is met by the former doing more for passengers, combining the carriage of freight with them, working four to five months longer in the year, being a less perishable property, and requiring no insurance like the steamboat, which together bring the two, on the score of capital, at least on a par.

Looking upon the New York and Albany, and New York and Erie railroads as adding to the useful and beneficial links in the great chain of the Union, a mixed physical and moral bond to it, they have had our hearty advocacy, and in framing these notes, in respect to them, we have endeavored to make them unanswerable commentaries on the superior cheapness and more general utility of the system itself, to which in due time the most sceptical will yield. The subject, indeed, is worthy of the special investigation we have before alluded to, and as the country generally is now making its observations for a fresh departure, it would be well not to start unprovided with correct views on the important item of internal improvements, which will be found almost indispensable, among the other means necessary to preserve it in a true and steady course for the future.

EXTRACT FROM THE MESSAGE OF THE GOVERNOR OF GEORGIA.

I lay before the legislature the report of the chief engineer of the Western and Atlantic railroad for the third quarter of the present year,* in which are stated the amount expended upon that work thus far, and the estimated cost of its completion. The sum expended is two millions one hundred and eighty-one thousand two hundred and seventy-two dollars and six cents, on account of which

* For this report, see R. R. Journal for October 1st.

a public debt has been incured, amounting, according to the best information at my command, to between thirteen and fourteen hundred thousand dollars. From the report of the President of the Board of Commissioners, a copy of which is laid before you, it will be seen that arrangements have been made for the completion of fifty-two miles of this road, beginning at the southeastern terminus, which will carry it two miles west of the Etowah river. It should be put into operation to that point, as soon as the connection of either of the branch roads with it will justify the belief that it may be profitably employed. The tunnel through Little Blue Ridge has been abandoned by the original contractor. This should be relet, that it may be in readiness to receive the superstructure when that point shall be reached. In the further prosecution of this work I would recommend the use of the strictest economy. The work should now be prosecuted gradually, and in such manner that the profits of that part which may be expected to be carried soon into operation may be applied to the construction. The corps of engineers should be reduced to the number that, when constantly and actively employed, shall be adequate to the superintendence of the entire work.

The Commissioners have resolved to subject the timber to be used on the road to the action of preservative salts, to prevent the expense arising from its decay. It may perhaps be prudent to lay down the ballance of the road in the hardy and durable timbers of the country through which it passes, until the efficiency of the preservative material be tested by the application already determined upon and we have evidence of our own experience of its economy.

The high moral obligations that the State is under to those enterprising companies which have been induced to incur heavy expenses, relying on the public faith; the immense facilities the road will afford the inhabitants of the north-western section of the State for the transportation of the abundant products of their fertile lands to a profitable market; the advantages of commerce it will open to the adjacent States, inviting their wealth to our borders, and offering them the most convenient and rapid communication with the Atlantic; the revenue it will bring to the State treasury, reimbursing the State for the entire cost of its construction, besides affording the means of either relieving the people from taxation, or executing any other public enterprise that may contribute to the general prosperity; its incalculable benefits in time of war, in the easy and speedy transportation of men and provisions to the point at which the assults of the enemy may be expected, all combine to recommend it to the fostering care of the representatives of the people. No local strifes, no sectional jealousies, no unjust prejudices, no partisan considerations should be permitted to stand in the way of the progress of a work which promises for Georgia, what the Erie canal has accomplished for New York.

While, however, I propose a steady perseverance in the execution of this noble enterprise, I would earnestly recommend its farther prosecution to be based upon permanent legislative provisions and regulations which shall not add to the burdens of the people.

Contributions should never be demanded from the people, unless equivalent benefits are secured to them, and this cannot be the case when public exactions exceed the probabilities of individual advantages. If the profits of this road, as it is gradually extended, are brought into the work and applied to the payment of the interest and gradual reduction of the principal of the debt contracted for its construction, it may be completed without resort to additional taxation.

NEW YORK THIRTY THREE YEARS AGO,—VIZ.—1808.

This year was one of the most remarkable in the history of the world, for the advancement of one branch of the sciences and the arts. Robert Fulton, whose name is now immortal, made his great and successful experiment in the art of propelling and constructing steamboats. On the return of Fulton from France he, with the aid of Chancellor Livingston, commenced his first steamboat; in 1807 she was launched, and in 1808 she was completed. In August of this year the public were on tip-toe to witness the first steamboat that ever floated. This boat was called the Clermont, after the country seat of the Livingston family. She started on the 17th August from the foot of Courtlandt street, N. R., in the presence of thousands who looked upon it as a visionary and foolish scheme. The success of this voyage is thus described in a letter of the great inventor himself.

Letter from Robert Fulton to the American Citizen:—

NEW YORK, AUGUST 20, 1808.

Sir:—I arrived this afternoon at 4 o'clock, in the steamboat from Albany. As the success of my experiment gives me great hopes that such boats may be rendered of much importance to my country, to prevent erroneous opinions and give some satisfaction to the friends of useful improvements, you will have the goodness to publish the following statement of facts:

I left New York on Monday, at 1 o'clock, and arrived at Clermont, the seat of Chancellor Livingston, at 1 o'clock on Tuesday—time, 24 hours—distance 110 miles. On Wednesday I departed from the Chancellor's at 9 in the morning, and arrived at Albany at 5 in the afternoon—distance 40 miles—time 8 hours. The sum of this is 150 miles in 32 hours, equal near 5 miles an hour.

On Thursday, at 9 o'clock in the morning, I left Albany, and arrived at the Chancellor's at 5 in the evening. I started from thence at 7 and arrived at New York on Friday at 4 in the afternoon—time 39 hours—space run through, 150 miles—equal to 5 miles an hour. Throughout the whole way, my going and returning, the wind was ahead, no advantage could be drawn from my sails; the whole has, therefore, been performed by the power of the steam engine.

Your obed't servant,

ROBERT FULTON.

Fulton, in a conversation with Judge Story, gave the following account of this experiment: "When," said he, "I was building my

first boat, the Clermont, at New York, the project was viewed by the public either with indifference or with contempt as a visionary scheme. My friends were civil but they were shy. They listened with patience to my explanations, but with a settled cast of incredulity on their countenances. I felt the force of the lamentation of the poet,

> "Truth would you teach, to save a sinking land,
> All shun, none aid you, and few understand."

As I had occasion to pass daily to and from my building yard while my boat was in progress, I had often loitered, unknown, near the idle group of strangers, gathered in little circles, and heard various inquiries relative to the object of this new vehicle. The language was uniformly that of scorn, sneer or ridicule. The loud laugh rose at my expense, the dry jest, the wise calculations of losses and expenditures, the dull but endless repetitions of the Fulton Folly. Never did a single encouraging remark, a bright hope or a warm wish cross my path. Silence itself was but politeness veiling its remarks or hiding its reproaches. At length the day arrived when the experiment was to be brought into operation. *To me it was a most trying and interesting occasion.* I invited my friends to go on board and witness the first successful trip. Many did me the honor to attend as a matter of personal respect, but it was apparent that they did it with reluctance, fearing to be partners in my misfortune and not of my triumph. I was well aware that in my case then, there were many reasons to doubt my own success.

The machinery was new and ill-made, and many parts were manufactured by mechanics unacquainted with such work; and unexpected difficulties might reasonably be presumed to present themselves, from other causes. The moment arrived when the word was to be given for the vessel to move. My friends were in groups upon the deck. There was anxiety mixed with fear among them. They were silent, sad and weary. I read in their souls nothing but disaster, and almost repented my efforts. The signal was given, and the boat moved on a short distance, and then stopped and became immovable. To the silence of the preceding moment, now succeeded murmurs of discontent, and agitations, and whispers and shrugs. I could hear distinctly repeated—"*I told you it was so,—it is a foolish scheme; I wish we were well out of it.*" I elevated myself on a platform, and addressed the assembly. I stated there, I knew not what was the matter, but if they would be quiet, and indulge me for half an hour, I would either go on, or abandon the voyage, for that time. This short respite was conceded without objection. I went below and examined the machinery, and discovered that it was a slight mal-adjustment of some of the work. In a short period it was obviated. The boat was again in motion: she continued to move on; all were incredulous: none seemed willing to trust their own senses. We left the fair city of New York:, we passed through the ever-changing scenery of the highlands: we descried the clustering houses of Albany: we reached its shores—and then, even then, when all seemed achieved, I was the victim of disappointment. Imagination

superceded the influence of fact. It was then doubted whether it could be done again, or if done, if it could be made of any value.

Fulton obtained a patent for his inventions for navigating with steam in 1804, and another for some improvements in 1811. Fulton was a native of New Britain in Lancaster county, Pennsylvania, and born in 1765, his parents were in humble circumstances and were enabled only to give him a common education. He early exhibited a fondness for painting, and at the age of 18 he established himself in Philadelphia. At the age of 22 he went to England to advance his talent, and was received into the family of West, with whom he spent several years, and entertained a warm friendship. During his stay he became acquainted with the Duke of Bridgwater and Lord Storhope, the former famous for canals, and the latter for his love of mechanism. He soon turned his attention to the use of steam for propelling boats. In 1796 he obtained a patent for a double inclined plane. He also professed himself a civil engineer, and published a treatise on canal navigation. He soon went to France and obtained patents for his improvements. He spent the succeeding seven years in Paris in the family of Joel Borlem, during which time he made himself acquainted with the French, Italian and German languages, and acquired a knowledge of mathematics, physics, and chemistry. He turned his attention to sub-marine explosions and in the harbor of Brest, demonstrated the success of his discovery. The British ministry invited him to London where he blew up a vessel, which led them to wish to suppress rather than encourage his improvement, they therefore gave him no employment.

In 1803, he made several experiments in steam to apply his principal to boats,—Chancellor Livingston was then minister to France. Fulton, with his aid, constructed a boat on the river Seine; this was in 1803, which fully evinced the practicability of applying it to boats. He determined to enrich his country with the discovery, and immediately embarked for the United States, and in 1806 commenced the construction of the boat, the results of which we have given. In 1811 Fulton was employed by the legislature to explore the routes of the canal, and was engaged with zeal in prosecuting that object, on the breaking out of the war. In 1812 he again experimented on sub-marine explosions. In 1814 he contrived an armed ship for the defence of New York, and invented a sub-marine vessel for plunging under water. These plans were approved by the government, but before he had accomplished them he died suddenly on the 24th Feb. 1815. His person was tall slender and well formed. We have thought proper to give this full account of the first steamboat that was constructed in this country, and of the great inventor. *The advantages that have followed this discovery are too great to be calculated.*

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LOCOMOTIVE PERFORMANCES.—Extract of a letter dated Sept. 9, 1841, from Captain William S. Moorsom, of the Royal Engineer Corps, and chief engineer of the Birmingham and Gloucester railway company, England.

"On Monday, 23d August last, the following trial was made on the Lickey inclined plane, near Bromsgrove, on the Birmingham and Gloucester railway.

"The plane is 2 miles and 3 chains in length, with a uniform rise of 1 foot 37 4-10ths, or a total rise of 285 feet.

"The engines tried were 'No. 65,' built by Mr. Bury, of Liverpool, and the 'Philadelphia,' built by Mr. Norris, of Philadelphia, their dimensions and weights being—

	*No. 65.	*Philadelphia.*
Cylinder,	13 inches.	12½ inches.
Stroke,	18 inch.	20 inch.
Wheel,	5 feet.	4 feet.
Weight empty,	10 tons 10 cwt.	10 tons 6 cwt.
	Adhesion of 4 wheels coupled.	Adhesion of 2 wheels.

"The engine 'No 65' began the trials with 6 wagons loaded with rails and a composite carriage, and stopped at the foot of the plane. She then tried 4 wagons and the carriage, and stopped 270 yards up the plane. The following loads were then taken, first by 'No. 65,' and then by the 'Philadelphia' in the same order, one wagon being taken off each time. Each Engine started about 150 yards distant from the foot of the plane, upon an inclination of 1 in 300.

No. 65.

Load exclusive of engine and tender, say 19 tons more.

	Tons.	Cwt.	Time of ascent.	Rate per hour.
3 wagons and 1 carriage,	24	12½	840 sec'ds,	8¾ miles.
2 do. 1 do.	17	18¾	534 do.	14 do.
1 do. 1 do.	11	4¾	349 do.	21 do.
1 do.	4	10	297 do.	24¾ do.

Philadelphia.

3 wagons and 1 carriage,	24	12½	483 do.	15¼ do.
2 do. 1 do.	17	18¾	446 do.	16½ do.
1 do. 1 do.	11	4¾	421 do.	17½ do.
1 do.	4	10	347 do.	21 do.

Pressure, 65 lbs. per inch.

"The 'Philadelphia,' has been working daily up this plane since June, 1840, with 5 wagons, each loaded with 6½ tons, and with four or five persons in each. She has taken as many as 8 wagons. I estimate the extreme load she has taken up, as equal to 82 tons, (including self and tender,) of 2240 pounds each. I congratulate you on this result. We shall also offer Mr. Stephenson a like trial, and I have no fears for the result.

Very truly yours,
WILLIAM S. MOORSOM.

* Mr Bury has not stated the weight of his engine, and I have taken the weight as stated to me by the foreman of his engine house.

NORRIS' ENGINES.—AMERICAN LOCOMOTIVES.

As additional evidence of the superiority of our machinery, must be gratifying to every true friend of improvement, we have extracted from a pamphlet recently received, several complimentary notices of Mr. Norris' engines, received from those connected with foreign railroads, who have had an opportunity of testing their capabilities.

Certificate of the Chief Engineer of the Berlin and Potsdam railroad.

The Berlin and Potsdam railroad company received from the manufactory of William Norris, of Philadelphia, two locomotive engines, the "*Prussia*" and "*America.*"

Previous to the arrival of these engines, the reputation of American machines was considerably weakened, and suffered much, by the bad performances of a locomotive engine built by another manufacturer, for the Leipsic and Dresden railroad. These machines of Norris', consequently, were looked upon with doubt and suspicion; and when they were put in operation, an express condition was made that no more than 45 lbs. pressure on the square inch should be used. With the greatest anxiety at the first trial, I ascended one of the engines; and with the greatest satisfaction at the result of its performance, I descended, with surprise and joy. After two months close observation and attention, I recommend these engines, with complete conviction of their efficiency, and under all circumstances, their adaptation to every railroad for all emergencies, and conquering all difficulties. Their motion is perfectly regular, and their speed great; the consumption of fuel very trifling, and their power so remarkable, that with a train of 16 full loaded cars, and only under a pressure of 45 lbs. to the square inch, they run with the greatest facility, at the rate of 27 miles per hour. I therefore recommend these engines, without hesitation, in preference to the best of any English manufacture.

If I could by the foregoing, testimony, convince the incredulous and irresolute of doubts of the efficiency and adaptation of these engines, and create by the same their general use, which have far exceeded our expectations, I then should feel sincerely gratified.

I also recommend Mr. William Gwynn, agent for Mr. Norris, as a gentleman upon whose word and veracity, those who would charge him with any orders, the greatest confidence can be placed.

Should any railroad company desire to have any further information of particular performances of these engines, I shall, with pleasure, give it, either verbal or written.

(Signed,) LOOF.
Chief Engineer of the Berlin and Pottsdam railroad company.

BERLIN, *October* 16, 1839.

From the Chief Engineer of the Birmingham and Gloucester railroad.

GLOUCESTER, *January* 16, 1840.

MY DEAR SIR:—In reply to your request expressed only this mor-

ning, that I should give you my opinion of Mr. Norris' locomotive engines, I have pleasure in stating briefly—I have worked for a period altogether, of about two months, at various times, over above 1500 miles of railway, with four of Mr. Norris' engines, three of them being of class B, and one of class A.

I have worked over various grades from one in thirty to a level, and with various loads from 120 to 30 tons, (up one in thirty, our load was 39½ tons at 13 miles per hour) and at various speeds. The general result in my mind is a conviction that Mr. Norris' engines are admirable machines, and calculated particularly for full loads, (say 100 tons) at a moderate speed (say 20 miles per hour,) and for such occasion I should prefer them to any English engines with which I am at present acquainted.

I have not yet had sufficient experience to judge of their durability but I should infer from what I have seen, that in this respect also they will prove fully as durable, and as economical as any that we have in this country.

Believe me, very truly, yours,

(Signed.) WILLIAM S. MOORSOM,
Late Captain of the 52d. Lt. Infantry and Civil Engineer.

WILLIAM GWYNN, *Esq., Chief Engineer and agent of* WILLIAM NORRIS, *Esq.,*
Philadelphia.

Copy of a letter received from WILLIAM S. MOORSOM, *Chief Engineer of the Birmingham and Gloucester railway, England.*

WORCESTER *July* 20, 1840.

MY DEAR SIR:—I reply to your request that I should give you my opinion of Mr. Norris' locomotive engines, I again have pleasure in stating briefly.

The Birmingham and Gloucester railway company are in possession of nine of Mr. Norris' engines, and have given orders for more.

I have certified under date of 16th January, 1840, to the excellent performances of Mr. Norris' engines of class A. and B., with heavy loads and at moderate speeds. My further experience of these classes of engines fully confirms that certificate, and also enables me to state that they are now performing on the Birmingham and Gloucester railway in an admirable manner. The usual train on this railway comprises four passenger carriages and two trucks, being an ordinary gross weight of 45 tons, with such trains, these engines class B, run on level grades at a speed of thirty-four miles per hour, and sometimes they make as much as thirty-eight per hour, without any difficulty arising out of the rapid action of the piston. On grades rising 1 to 300, they take the same train at a speed of 24 to 25 miles per hour.

I have lately tried on the Lickey inclined plane, (which rises one in 37½) one of Mr. Norris' engines of class A, weighing 10 tons, with 12½ inch cylinder, 20 inch stroke and 4 feet driving wheels; I have under date 22d June, stated to you the performance of this engine, and I have only to add, that in the letter alluded to, I have

underrated the work done, in consequence of my not having then ascertained the friction of the wagon used.

I now conclude that whether the rails are wet or dry, the Philadelphia will take up the plane, a gross load of

81 tons	at an ultimate speed of	9	miles per hour.
74 "	" " "	10 "	" "
53 "	" " "	15 "	" "

and in the best or dry state of the rails and weather, she will exceed the above performances, which are as I believe, nearly double as much as any engine in England has ever been authentically reported to perform.

(Signed.) WILLIAM S. MOORSOM.
Chief Engineer of the Birmingham and Gloucester railroad.

WILLIAM GWYNN, *Esq., Engineer and agent of* WILLIAM NORRIS.

SAFETY ROTATION RAILWAY.

We have been to a private view of this ingenious contrivance to effect a rapid power of locomotion with more safety, less expense, and with equal or greater speed than is achieved by the present system of railways. The following is a brief outline of the plan:

"The safety rotation railway is an inversion of the ordinary construction, inasmuch as wheels are made to revolve on fixed bearings, placed in two parallel lines along the road; and the carriage, without wheels, is built upon a pair of running rails, carried along upon the peripheries of the train of wheels kept in revolution by steam engines at fixed distances. The wheels may be driven by a succession of endless bands, or any other mode of actuating them one band in every case passing around two pulleys attached to every two adjacent wheels. The carriages are designed to hold forty passengers each, with luggage, the whole, including the carriage, not to exceed five tons; the running rails always to bear on eight or ten wheels, so that no wheel shall have to support more than 10 or 1200 weight. The luggage box is made to pass between the line of wheels and so reach below their centres, kept in place by a pair of guide pulleys; so that the carriages cannot get off the road, nor can they meet or overtake each other, consequently no collision, can take place. It is practicable by this system (the carriages being despatched singly) to ascend steeper acclivities than ordinary, so that the expense of tunnelling would be obviated, and of cutting and embanking considerably reduced; and railways may be made available in fifty districts, from which they are now excluded, nothing more than the bare weight of a slight carriage, its passengers, and luggage, being required to be elevated, thus saving the enormous power necessary for carrying up a heavy locomotive engine and its appendages.

"On this road the public may travel with safety, ease, and comfort, unaccompanied by the nuisance of a locomotive engine and free from annoyance by sparks, smoke, or dust.

"It is calculated that not only the cost of the construction of a safety rotation railway will not exceed two-thirds of the expenditure now actually required for one of equal dimensions of an ordinary nature, but the annual saving in the maintaining it in constant and substantial repair, will be 70 per cent. less than what is ordinarily required for the like purpose in railways now used.

"For this ingenious plan we are indebted to the scientific abilities of Mr. John Rangeley, who has obtained a patent for the invention, and who is inviting the public to take part in the formation of a railway of sufficient dimensions to prove its efficiency when carried into operation, and to test by actual experiment whether the friction in this mode of construction will be greater than in the ordinary way.

"If the plan be found to succeed, there will be no difficulty, in the opinion of other eminent engineers, in connecting the rotation railways with those now in use.—*English paper.*

[From the Railway Magazine.]

SUCCESS OF LONG LINES OF RAILROADS.

London and Birmingham and Grand Junction Railway Companies.—Table showing the amount of capital advanced by the shareholders; the present market value of the shares; and the amount of profit resulting therefrom:—

London and Birmingham Railway—112½ *miles.*

	Nominal amount	Paid up.		Market value, Feb. 1, 1841.	
Shares.	of shares.	Per share.	Amount.	Per share.	Amount.
25,000	£100	£90	£2,250,000	£179	£4,475,000
25,000	25	5	125,000	30½	762,500
31,250	32	32	1,000,000	60	1,875,000
			£3,375,000		£7,112,500

Grand Junction Railway—83 *miles.*

Exclusive of the part of the Liverpool and Manchester railroad, which forms a part of the line to Liverpool:

	Nominal amount	Paid up.		Market value, Feb. 1, 1841.	
Shares.	of shares.	Per share.	Amount.	Per share.	Amount.
10,918	£100	£100	£1,091,800	£214	£2,336,452
10,918	50	40	436,720	106	1,157,308
17,000	25			29	493,000
5,000	50	50	250,000	52½	262,500
			£1,778,520		£4,249,260

Recapitulation.

Market value of London and Birmingham railway shares	£7,112,500
Market value of Grand Junction railway shares	4,249,260
	£11,361,760

Money advanced by shareholders of London and Birmingham railway shares - - - -	£3,375,000	
Money advanced by shareholders of Grand Junction railway shares -	1,778,520	
		5,153,520
Profit (equal to $29,799,552) - - - -		£6,208,240

The Grand Junction railroad is a continuation of the London and Birmingham railroad, and forms with it and about half the Liverpool and Manchester, an aggregate length of 209½ miles. This is *about* the same length of line as is presented by the Worcester railroad and Western railroad, from Boston to Albany, which form an aggregate line of 200 miles. This last line is a continuation of the Erie canal, on which the tolls and freight will, this year, exceed $5,000,000.—*Boston Daily Advertiser and Patriot.*

Wooden Pavements.—A correspondent of the Charleston Courier has been advocating, with great earnestness, the adoption of wooden pavements in that city, appealing to the experience of London, of New York, and of Philadelphia, to sustain his argument. The London papers all agree in stating that the wooden blocks have proved to be an excellent pavement, and that on taking them up, after two years use, they exhibit no evidence of rotting. We hear but little from New York; but of Philadelphia, we may say that, so far as the experiment has been tried, it has not been found successful. The blocks have rotted after two years, and made a rougher surface by far than the ordinary paving stones. The experiment, then, has not been successful. The blocks in Walnut street, opposite the exchange, are of a shape quite different from those first used, but the shape of the block cannot have much effect in preserving them from rotting.

But as all consider the subject of much importance, we may perhaps inquire as to the cause of the failure. In the frst place, the lightest wood was used because it was the cheapest, viz: hemlock, with pores always open, taking in every drop of moisture that falls upon the block. In the next place, the mode of laying the blocks has not been the best.

We are not prepared to say what would be the difference in durability between hemlock and some of the harder woods—gum, for instance, or chesnut; it must, however, be very considerable, and seasoned gum might have given a different result to the experiment.

We have hitherto spoken of blocks with no other preparation than that of shaping. But a part of the pavements tried in different streets of the city was of blocks saturated with some preservative solution under the direction of Dr. Earle, and after a formula of his invention. These have now been down, we think, two years; and, if we mistake not they have thus far withstood the atmosphere above and the moisture of the earth below. We shall, at another time, make closer inquiries as to the result of the experi-

ment of Dr. Earle's plan, and report thereupon; because we think that it is of great importance. We are satisfied that if Kyanising or injecting by Dr. Earle's mode will remove the liability of wood to rot, then the community will call for its use as a pavement. Even should the cost very much exceed that of pebble paving, the comforts to all, and the merciful operation upon the beasts, commend it to consideration and adoption.—*U. S. Gaz.*

Canal Boats.—Modern improvements in ship building have lately reached the lesser and more humble (though perhaps not the less useful water craft,) canal barges. A part of these improvements consist in increased capacity for carrying without any material increase in the draft of water; thus, for instance, we remember well when thirty tons was about the average burden of coal boats on the Schuylkill canal, where of late years 50 to 60 tons is a common load. On the Tide Water canal, the largest and finest class of boats are more generally employed, some of which may be seen at our wharves daily, and among them, we noticed yesterday the new and well equipped boat Juniatta, Captain Woods, now loading with merchandise, below Spruce street, for Lewistown, Mifflin county. This barge is capable of carrying 3,100 bushels of wheat, and then only drawing three and a half feet of water. She belongs to the line of Messrs. S. & S. Milliken, of Lewistown.—*U. S. Gazette.*

Atmospheric Vacuum Engine.—The Louisville Advertiser notices a new invention by a Mr. Lanning, of that city, which would be invaluable, if the principle could be successfully applied to the propelling of heavy machinery. It is an engine which is put into operation by atmospheric air, dispensing with boilers, water, and steam, and putting all danger of explosion out of the question. It is thus described:—

"In its construction it is exceedingly simple. Two tubes, or *chimneys*, capable of bearing a pressure of fifteen pounds to the inch, are placed perpendicularly over a stove or furnace, from which a flue leads to each. The flues have valves at each end. A fire is lighted in the furnance, the blaze of which ascends into one of the chimneys, (the other being closed by the valves.) This rarifies the air, which rushes through a pipe into a common cylinder, and moves the piston. The action of the engine shuts the first flue, in which a vacuum is created, while the heat and propelling force are changed to the other, producing the reverse motion. Thus heated, air is applied to the common engine in the same manner as steam. With a slight fire, we saw the engine put in motion, and, though but a rough model and upon a small scale, it afforded sufficient power to drive a common fanning mill, or wheat cleaner, with considerable rapidity. It will require *less fuel* than is necessary in working a steam engine, no water nor boilers. We understand that the inventor has received liberal proposals already, from men of capital, who have confidence in its complete success."